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Customer Support Dept.
April 1, 2003

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H8S/2140B Series Expansion I/O Board (HS2140EIO61H) for E6000 Emulator

User's Manual

ADE-702-310

Rev. 1.0
04/08/02
Hitachi, Ltd.

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IMPORTANT INFORMATION

READ FIRST

• READ this user's manual before using this emulator product.

• KEEP the user's manual handy for future reference.

Do not attempt to use the emulator product until you fully understand its mechanism.

Emulator Product:

Throughout this document, the term "emulator product" shall be defined as the following products produced only by Hitachi, Ltd. excluding all subsidiary products.

- E6000 series emulator station
- Expansion I/O board
- User system interface cables
- PC interface board

The user system or a host computer is not included in this definition.

Purpose of the Expansion I/O Board:

This expansion I/O board is installed in the E6000 emulator, and enables the emulator station to be connected to the user system interface cable. This expansion I/O board must only be used for the above purpose.

Improvement Policy:

Hitachi, Ltd. (including its subsidiaries, hereafter collectively referred to as Hitachi) pursues a policy of continuing improvement in design, functions, performance, and safety of the emulator product. Hitachi reserves the right to change, wholly or partially, the specifications, design, user's manual, and other documentation at any time without notice.

Target User of the Emulator Product:

This emulator product should only be used by those who have carefully read and thoroughly understood the information and restrictions contained in the user's manual. Do not attempt to use the emulator product until you fully understand its mechanism.

It is highly recommended that first-time users be instructed by users that are well versed in the operation of the emulator product.

LIMITED WARRANTY

Hitachi warrants its emulator products to be manufactured in accordance with published specifications and free from defects in material and/or workmanship. Hitachi, at its option, will repair or replace any emulator products returned intact to the factory, transportation charges prepaid, which Hitachi, upon inspection, determine to be defective in material and/or workmanship. The foregoing shall constitute the sole remedy for any breach of Hitachi's warranty. See the Hitachi warranty booklet for details on the warranty period. This warranty extends only to you, the original Purchaser. It is not transferable to anyone who subsequently purchases the emulator product from you. Hitachi is not liable for any claim made by a third party or made by you for a third party.

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Figures:

Some figures in this user's manual may show items different from your actual system.

Limited Anticipation of Danger:

Hitachi cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this user's manual and on the emulator product are therefore not all inclusive. Therefore, you must use the emulator product safely at your own risk.

SAFETY PAGE

READ FIRST

• READ this user's manual before using this emulator product.

• KEEP the user's manual handy for future reference.

Do not attempt to use the emulator product until you fully understand its mechanism.

DEFINITION OF SIGNAL WORDS

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER **DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION **CAUTION** used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

NOTE emphasizes essential information.

⚠ WARNING

Observe the precautions listed below. Failure to do so will result in a FIRE HAZARD and will damage the user system and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

1. **Do not repair or remodel the emulator product by yourself for electric shock prevention and quality assurance.**
2. **Always switch OFF the E6000 emulator and user system before connecting or disconnecting any CABLES or PARTS.**
3. **Always before connecting any CABLES, make sure that pin 1 on both sides are correctly aligned.**
4. **Supply power according to the power specifications and do not apply an incorrect power voltage. Use only the provided power cable.**

Preface

Thank you for purchasing this H8S/2140B series expansion I/O board (HS2140EIO61H; hereinafter referred to as the expansion I/O board) for the H8S series E6000 emulator.

The expansion I/O board enables user systems for Hitachi's original microcomputer H8S/2140B series to be developed using an H8S/2148B series E6000 emulator (HS2140EPI61H; hereinafter referred to as the emulator).

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Section 1 Overview

The H8S/2140B series E6000 expansion I/O board (hereinafter referred to as the expansion I/O board) is an efficient software and hardware development support tool for application systems using Hitachi's original microcomputers H8S/2140B series LPC (Low Pin Count) interface.

The expansion I/O board should be used with H8S/2148B series E6000 emulator station (HS2140EPI61H: hereinafter referred to as the emulator).

1.1 Environment Conditions

Table 1.1 Environment Conditions

Item	Specifications
Temperature	Operating: +10 to +35°C
	Storage: –10 to +50°C
Humidity	Operating: 35 to 80% RH; no condensation
	Storage: 35 to 80% RH; no condensation
Ambient gases	No corrosive gases
Power supply	Power supply from E6000 emulator station
User system voltage (UVcc)	Depends on the target MCU within the range 2.7 V to 3.6 V

1.2 Supported MCUs and User System Interface Cables

Table 1.2 shows the correspondence between the MCUs and the user system interface cables supported by the E6000.

H8S/2140B Series:

Table 1.2 H8S/2140B Series MCUs and User System Interface Cable

No.	MCU Type Number	Package	E6000 User System Interface Cables
1	HD64F2140B	100-pin QFP(FP-100B)	HS2148ECH61H
	HD64F2141B	100-pin TQFP(TFP-100B)	
	HD64F2145BV		

1.3 Operating Voltage and Frequency Specifications

Table 1.3 shows an example of the MCU operating voltage and frequency specifications supported by the E6000. If the E6000 is used in an environment that exceeds the operating voltage range and operating frequency range guaranteed for the MCU operation, normal emulator operation is not guaranteed.

Table 1.3 Operating Voltage and Frequency Specifications

No.	MCU Types	Operating Voltage (V)	Operating Frequency (ϕ) (MHz)
1	H8S/2140B series	2.7-3.6	2-10

NOTE

For details on the operating voltage and frequency specifications, refer to the MCU hardware manual.

1.4 Components

Figure 1.1 shows the HS2140EIO61H expansion I/O board appearance, and table 1.4 lists the components of the expansion I/O board. Please make sure you have all of these components when unpacking.

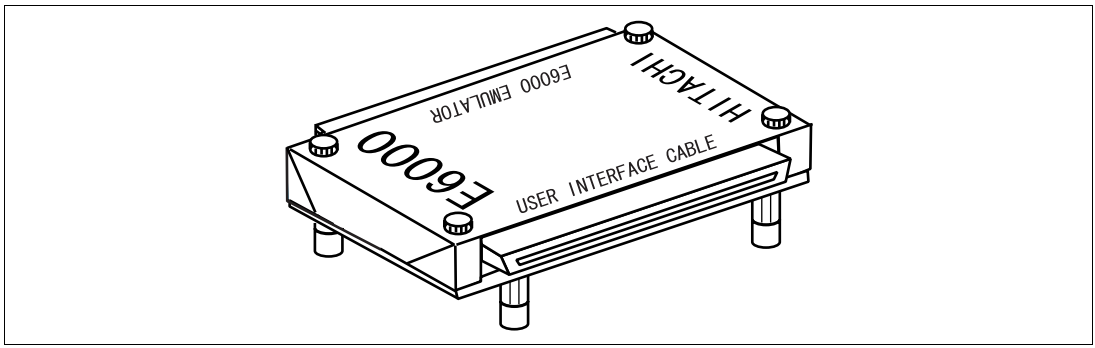

Figure 1.1 HS2140EIO61H Expansion I/O Board

Table 1.4 HS2140EIO61H Components

No.	Component	Quantity	Remarks
1	HS2140EIO61H	1	Expansion I/O board
2	Documentation	1	User's manual for HS2140EIO61H (this manual)

1.5 Opening the Case of Expansion I/O Board

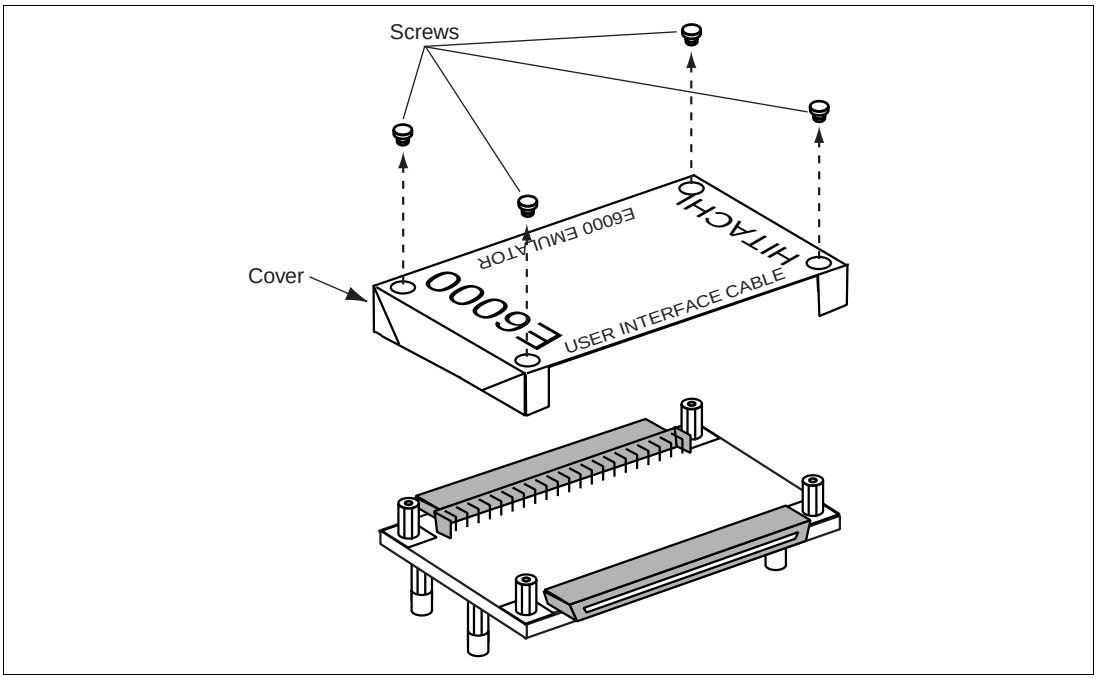

Figure 1.2 Opening the Case of the Expansion I/O Board

To open the case of the expansion I/O board, remove the four screws on the cover. To close the case, place the cover on the expansion I/O board, and fix it with the four screws.

To prevent breaking of wires in the expansion I/O board, do not place heavy or sharp metal objects on the expansion I/O board while the case is open.

Section 2 Connection Procedures

⚠ WARNING

Always switch OFF the user system and the emulator product before the EXPANSION I/O BOARD or USER SYSTEM INTERFACE CABLE is connected to or removed from any part. Before connecting, make sure that pin 1 on each side is correctly aligned. Failure to do so will result in a FIRE HAZARD and will damage the user system, the emulator product, the user system interface cable, and the expansion I/O board, or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

2.1 Using Emulator without Connecting User System

1. Make sure the emulator is turned off.
2. After making sure the direction of the expansion I/O board connector labeled E6000 EMULATOR is correct, firmly insert the expansion I/O board connector into the emulator station connector. When the emulator is operated while connected to only the expansion I/O board (without connecting the user system), disconnect the cable body from the expansion I/O board.

2.2 Using Emulator with Connecting User System through User System Interface Cable

CAUTION

When connecting or removing the user system interface cable, apply force only in the direction suitable for connection or removal, while making sure not to bend or twist the cable or connectors.
Otherwise, the cables or connectors will be damaged.

1. Make sure the emulator and the user system are turned off.
2. [1] After making sure the direction of the expansion I/O board connector labeled E6000 EMULATOR is correct, firmly insert the expansion I/O board connector into the emulator station connector ([1] in figure 2.1).
   [2] To connect the expansion I/O board labeled USER INTERFACE CABLE and the user system interface cable body.

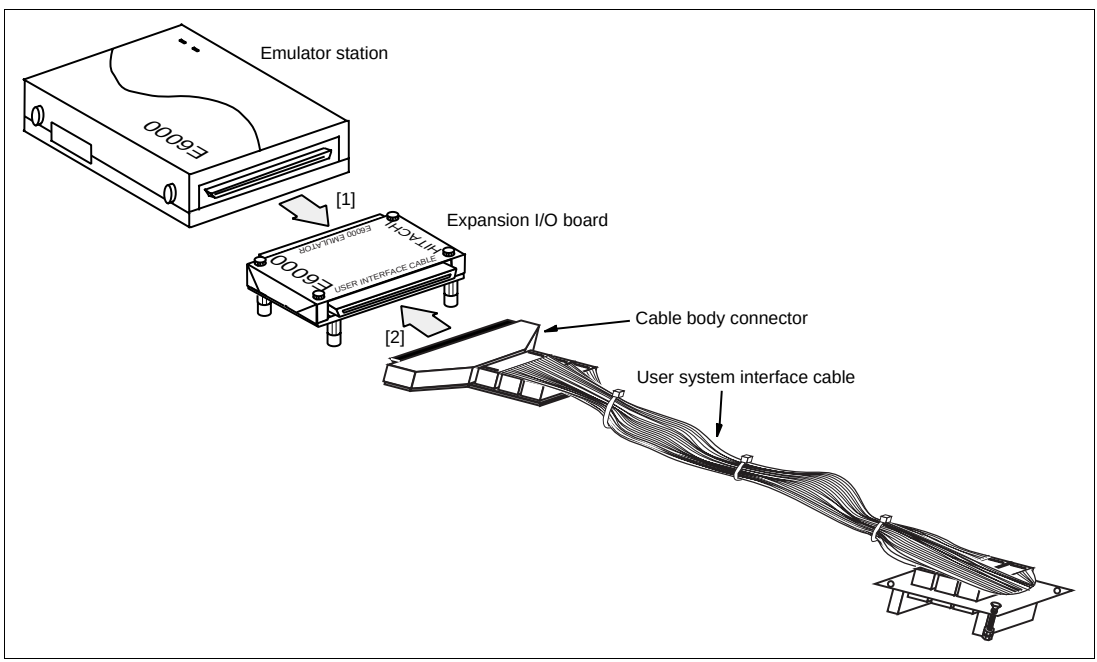

Figure 2.1 Connecting Expansion I/O Board to Emulator Station and User System Interface Cable

Section 3 User System Interface

Switches, protection circuit, and termination circuits are provided for the H8S/2140B LPC interface of the expansion I/O board. Signals are connected to the user system interface cable with the protection circuit. Figure 3.1 shows user interface circuit.

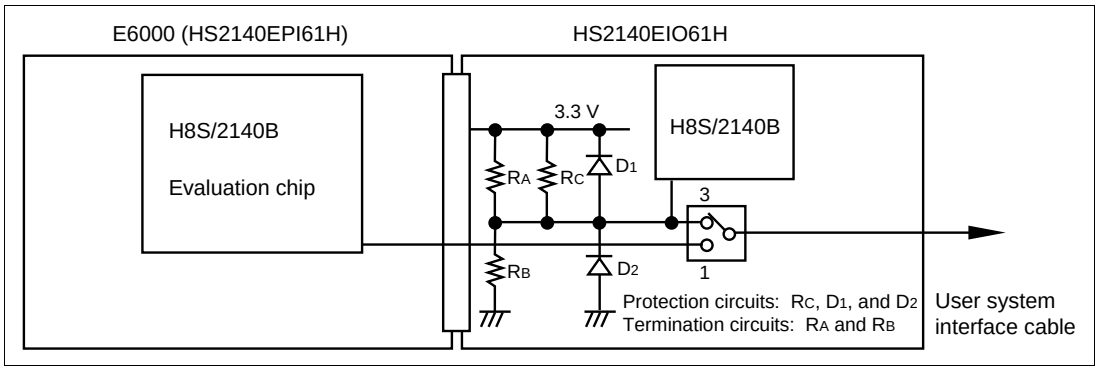

Figure 3.1 User System Interface Circuit

Table 3.1 shows switches and circuit description.

Table 3.1 User System Interface Description

No.	Signals	Switch	Termination circuit R_A	Termination circuit R_B	R_C, D_1, D_2	Notes
1	LAD0	SW7 side 3	Pull-up (R1)	Pull-down (R2)	R_C is 47 k ohm (must not be removed) D_1, and D_2 are not connected.	SW7 side 1 is port 30
2	LAD1	SW8 side 3	Pull-up (R3)	Pull-down (R4)		SW8 side 1 is port 31
3	LAD2	SW9 side 3	Pull-up (R5)	Pull-down (R6)		SW9 side 1 is port 32
4	LAD3	SW10 side 3	Pull-up (R7)	Pull-down (R8)		SW10 side 1 is port 33
5	LFRAMEN	SW11 side 3	Pull-up (R9)	Pull-down (R10)		SW11 side 1 is port 34
6	LRESETN	SW12 side 3	Pull-up (R11)	Pull-down (R12)		SW12 side 1 is port 35
7	LCLK	SW13 side 3	Pull-up (R13)	Pull-down (R14)		SW13 side 1 is port 36
8	SERIRQ	SW14 side 3	Pull-up (R15)	Pull-down (R16)		SW14 side 1 is port 37
9	WUEN0	SW15 side 3	None	None	R_C is not connected. D_1,and D_2 are connected (must not be removed).	SW15 side 1 is port B0
10	WUEN1	SW16 side 3				SW16 side 1 is port B1
11	WUEN2	SW17 side 3				SW17 side 1 is port B2
12	WUEN3	SW18 side 3				SW18 side 1 is port B3
13	WUEN4	SW19 side 3				SW19 side 1 is port B4
14	WUEN5	SW20 side 3				SW20 side 1 is port B5
15	WUEN6	SW21 side 3				SW21 side 1 is port B6
16	WUEN7	SW22 side 3				SW22 side 1 is port B7
17	PMEN	SW23 side 3				SW23 side 1 is port 80
18	GA20	SW24 side 3				SW24 side 1 is port 81
19	CLKRUNN	SW25 side 3				SW25 side 1 is port 82
20	LPCPDN	SW26 side 3				SW26 side 1 is port 83

Note: Pin sockets are mounted on the expansion I/O board so that resistors can be mounted on R1 to R16 by the user. Resistors are not mounted on R1 to R16 at shipment.Resistors can be mounted on R1 to R16 by the user.

CAUTION

SW6 has a different circuit structure compared to other switches.

Side 3: When using WUEN7 as an IRQ7 interrupt, set SW6 to side 3. In this case, be aware that the PA1 pin function cannot be used.

Side 1: PA1 pin function can be used. In the case, be aware that WUEN7 cannot be used as an IRQ interrupt.

Figure 3.2 shows location of switches and resistor.

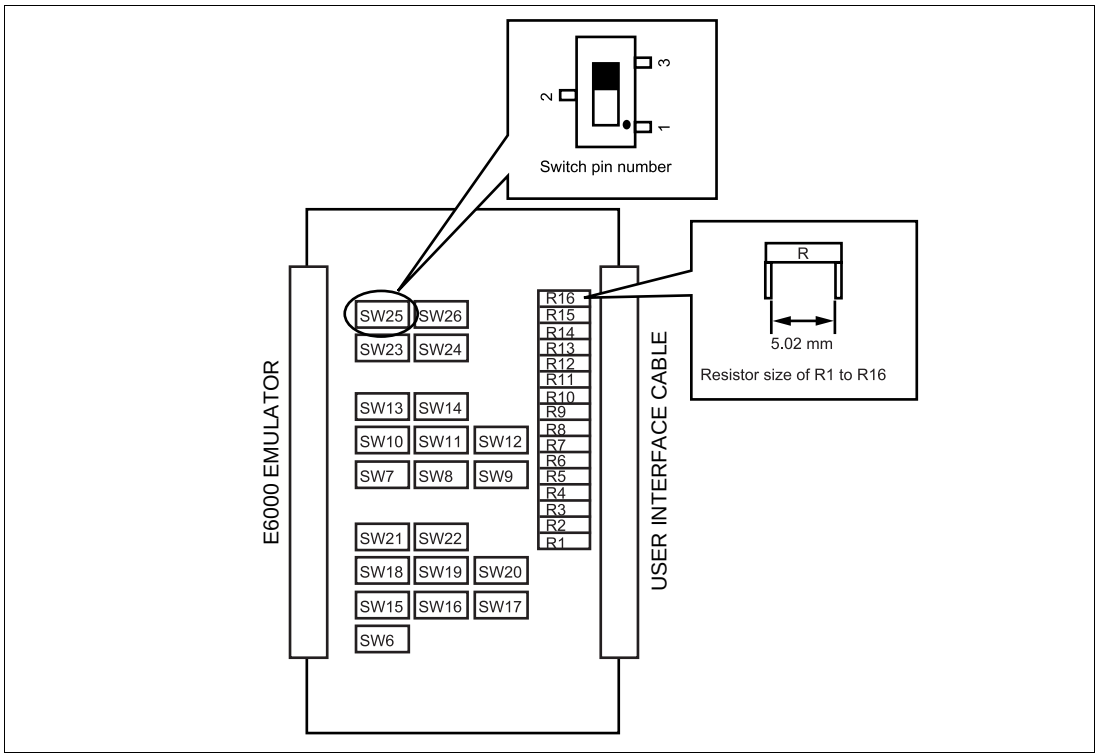

Figure 3.2 Location of Switches and Resistor

Section 4 Notice

⚠ WARNING

Observe the precautions listed below. Failure to do so will result in a FIRE HAZARD and will damage the user system and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

1. **This expansion I/O board is specifically designed for the HS2140EPI61H. Do not use this expansion I/O board with any other emulator station.**
2. **Use the H8S/2148, 2140B series user system interface cable (HS2148ECH61H for FP-100B or TFP-100B). Do notuse any other series of user system interface cable.**

1. Do not place heavy objects on the expansion I/O board.
2. Power is supplied from the emulator station to the expansion I/O board.
3. LPC Module and Ports C to G Reset Specifications
   For **the reset function of the LPC module** note that there are differences between the H8S/2140B series E6000 expansion I/O board and the target MCU. The reset conditions for the CPU and other modules than the LPC have no differences.

Reset Type	Internal Reset by WDT Overflow	Go RESET, CPU RESET Commands	Reset Signal Input of Target System
E6000 expansion I/O board	Reset enabled	Reset disabled	Reset enabled*
Target MCU	Reset enabled	—	Reset enabled

Note: RESET signal from the target board to the evaluation chip can be masked by setting RESET MASK check box in Configuration window of HDI. But reset signal for the LPC module are always enabled when RESET MASK in Configuration of the HDI is either enabled or disabled. When user debugs target system with the expansion I/O board, disable RESET MASK and always input RESET signal from the target system.